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THE DISTRIBUTION OF BRIGHT SUNSHINE OVER THE BRITISH ISLES.

By Richard H. Curtis.

Before proceeding to discuss the average distribution of "bright" sunshine over the British Islands, it may be useful to try first of all to define what "bright sunshine" is. At first sight this may appear to be a very simple matter, but, as a matter of fact, in this as in many similar cases the question is more easily asked than answered.

At the outset we are met with a difficulty, arising from the fact that the sun's rays present a complex phenomenon about which there is still a good deal to learn. They differ very much in wave-length, and, therefore, the effects they are capable of producing are very varied also; and it must be remembered that it is only by their effects that the different rays can be identified and their intensity measured. Besides this, the number of rays of a given wave-length appears to bear no fixed relation to the number of rays of any other wave-length, but on the contrary their proportions are constantly changing, owing to the process of absorption to which the rays become subjected when they enter the atmosphere. The extent to which this absorption occurs depends upon the humidity of the air, and even more upon the presence of dust particles, by which the rays of shorter wave-length are stopped, while the longer ones continue to pass more or less freely. The dust particles also form nuclei for the condensation of the aqueous vapour, and when water becomes deposited upon them their obstructive power is greatly increased, until the point being reached at which a cloud is formed no *direct* solar rays can pass at all.

In dealing with the rays emitted by the sun, we may regard them from three points of view: we may consider the amount of light they bring us, or their heat, or the energy of their chemical action. For meteorological purposes, the most important solar radiations are without doubt the heat rays, for it is they that chiefly, if not entirely, affect the movements of our atmosphere. The chemical, or actinic, rays, and also the light rays, play an important part in the economy of animal and vegetable life, and so come within the scope of applied meteorology, and, therefore, they too ought to be included in any

record purporting to completely represent the sun's radiations. Up to now, however, no instrument has been devised which will satisfactorily supply such a complete record; and, therefore, when we wish to register the intensity of the solar action, we have first to decide whether for the particular purpose in view it is most desirable to record the intensity of the solar *heat*, or of the sun's *light*, or of its *actinic* rays.

For some years meteorological observers were somewhat divided upon the relative merits of the first and third of these groups; less probably because they had any doubt as to which was, meteorologically, the mose important, than because the record of the actinic rays could be more easily got, and also, perhaps, some may have thought that those rays afforded a truer approximation to the intensity of the whole solar radiation than the record of solar heat could supply.

Two forms of recorder have, therefore, been in use for recording "bright sunshine":—one in which the intensity of the actinic radiation is recorded by means of photography; the other a "burning" recorder, in which the focussed heat rays write their record upon a strip of card.

As might be expected from what has just been said, these two records frequently differ a good deal from each other, and the difference is not always in the same direction. Sometimes it is the photographic recorder which registers the greater record, and at other times its record is considerably less than that of the burning recorder. The opinion was at one time rather generally held that the photographic record *always* exceeded the other; but that idea was based chiefly upon some very unsatisfactory figures, published some ten or twelve years ago, as the result of a comparison which has been shown to have been worthless.* Since then, several prolonged comparisons of the records by the two styles of instrument have been carried out, and the general result has been to show that the differences from day to day nearly balance each other over the longer period of a month, and that the yearly amounts of bright sunshine recorded by both are practically alike.†

For the sake of uniformity, however, and in order that records from all places however widely separated, and for short as well as for long periods, may be satisfactorily compared, it became necessary to decide finally which of the two forms of recorder should be adopted as the standard for meteorological purposes, and Dr. Shaw, F.R.S., the Director of the Meteorological Office, has decided that for the official publications of his department, and from the beginning of the year 1906, only the records of the burning recorder shall be employed.

Briefly described, the burning recorder consists of a sphere of

* See *Quart. Journ. Roy. Met. Soc.*, Vol. **24**, p. 1.

† Such comparisons have been made by Mr. March, F.R.Met.Soc., at Torquay: Mr. Cresswell, at Edgbaston; and especially by Mr. Baxendell, F.R.Met.Soc., at Southport.

crown glass, four inches in diameter, which is placed upon a pedestal centrally in a metal frame designed to carry a strip of coloured card. The sun's rays passing through the lens are focussed upon the card, and if the heat rays are of sufficient intensity they burn it, the burn varying from a faint discoloration with weak sunshine to a clean burn right through the card when the sun shines with greater force.

Here then we reach a definite standard, which enables us to give an arbitrary, but at the same time a perfectly reasonable, definition of "bright sunshine," which may be definined as beginning when the radiation of solar heat beams sufficient to at least char a strip of coloured card, after the sun's rays have been passed through a spherical lens under the conditions just described. It is the direct solar radiation covered by this definition, whose distribution over the British Isles I now proceed to discuss.

The sunshine recorder first took its place as a meteorological instrument for general use in the year 1880, and there are now available more than twenty-five years' observations for a few places, and series covering shorter periods for a large and steadily increasing number. There are, however, unfortunately still many parts of the Kingdom for which at present no data are forthcoming. In constructing the map which accompanies this article, I have used the averages published by the Meteorological Office, to which I have added others which have been derived from various sources, weighting them as far as possible for the length of the period they cover.

There are two ways in which the records of bright sunshine may be dealt with:—we may consider the actual number of hours recorded, or we may regard that number as a percentage of the time during which the sun remained above the horizon of the place of observation; or, in other words, as a percentage of the total amount of sunshine possible, supposing the sun to have been shining without obstruction from sunrise to sunset. Obviously, latitude is also an important factor in the record, because the heating power of the sun's rays is directly influenced by the sun's altitude; but so far it has not been customary to take this into account, nor to make any allowance for the obstruction of the sun's rays caused by physical features of the surrounding district, such as high hills; in the accompanying map the average number of hours recorded at the several stations has been used in drawing the "isohels."

The sunniest parts of the United Kingdom are the most southern, the annual total of hours' duration decreasing as we proceed northward, from 1,900 hours in the Channel Islands to only 1,200 hours over the north of Scotland. The lines of equal duration show, however, a strong tendency to follow the lines of the coast both in the east and the west, and this feature is well shown by the stations adjacent to the St. George's Channel. A large part of the central area of England, and of the south-west of Scotland, is adversely influenced by the smoke and dust of the large manufacturing centres, which becoming dispersed through the atmosphere to leeward screens

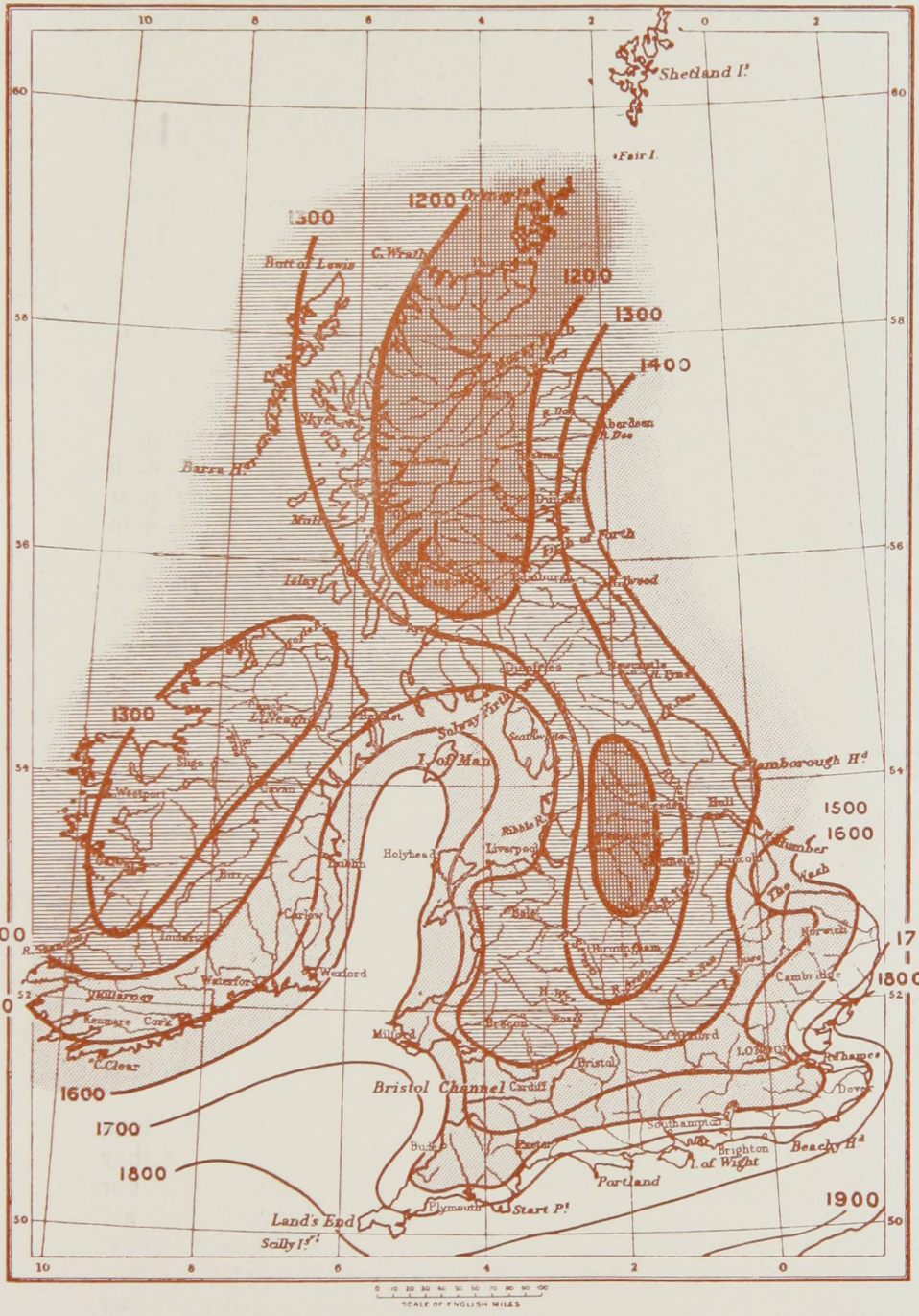
off a large percentage of the sun's heat rays, and of course the immediate neighbourhoods of these centres suffer most of all; the map is, however, too small to allow of their being specially indicated. To some extent the hilly, and therefore rainy, districts of the west show smaller sunshine totals than places on the eastern littoral in the same latitude; but this is indicated more in certain months than in others, and a heavy rainfall and large total of sunshine frequently occur at the same station, the explanation being that a large rainfall is not necessarily a prolonged one. Unfortunately, as has already been said, some portions of the Kingdom are still very inadequately represented by sunshine recorders, and for these regions the lines on the map are somewhat hypothetical; a great part of Ireland, Central Wales, and the Highlands of Scotland are such regions, but it is perhaps not too much to hope that in the next few years this defect will largely be removed.

Of the several months, May and June are the most sunny, and December is almost everywhere the least so. In winter, the largest totals of sunshine are obtained in the rainy south-west; and at that season of the year the effect of the ejecta from the towns is felt in their neighbourhoods more severely than at any other period, the lower altitude of the sun making it more difficult for its rays to penetrate the dusty screen they have to traverse before reaching the Earth. There are, however, many points of view from which the data given in the map might be discussed. The relation between the average duration of sunshine and the mean temperature, the range of temperature, the temperature of the soil, the cloudiness of the sky, and the prevalence of rain, are some of those which might be dealt with did space permit.

Total number of hours during which the sun is above the horizon in each month, and for the whole year; for each 2° of Latitude from 50° to 60°.

Months.	LATITUDE.					
	50°	52°	54°	56°	58°	60°
January	265	256	246	235	223	208
February	280	275	271	266	259	253
March	365	365	364	363	363	362
April	410	413	417	422	427	432
May	474	483	491	501	513	526
June	487	497	509	523	539	558
July	491	501	511	524	538	555
August	447	453	459	466	473	482
September	379	380	382	383	385	387
October	334	331	327	323	319	315
November	272	265	258	249	239	227
December	251	241	229	216	202	184
YEAR	4455	4460	4464	4471	4480	4489

AVERAGE ANNUAL DURATION OF SUNSHINE



By RICHARD H. CURTIS.

The foregoing Table gives the total possible duration of sunshine for every month, and for each two degrees of latitude from 50° to 60°. Some of our readers may desire to express their monthly results as percentages of these possible amounts, which may readily be done by dividing the recorded monthly total by the number in the Table corresponding to the month and the latitude of the station.

THE BRITISH ASSOCIATION AT LEICESTER.

(SECOND ARTICLE).

THE following Abstracts and Reports are all the available material provided by Section A for the assistance of the Press in following the meteorological discussions which took place at the meeting.

Examples of the Modern Methods of Treating Observations. By W. Palin Elderton.

This communication dealt with the application of recognised statistical processes to meteorological statistics. The terms *mean*, *median*, and *mode* were defined, and the methods of calculating their values given, with examples from rainfall statistics. The "*method of moments*" was described, and as an application a parabolic curve was fitted to statistics of rainfall in the east of England. The *standard deviation* was then explained, and it was pointed out that this function measures the way the observations are scattered about their mean. The importance of calculating a "standard deviation" or a "probable error" corresponding with means was then insisted on; the mere statement of a mean is statistically insufficient and of no use for comparative purposes until we know what deviations from the calculated value may arise.

The remainder of the communication dealt with correlation. The coefficient of correlation was first explained, and it was shown how it can be calculated. The rainfall in the east of England was compared with that in the north of Scotland and in the Channel Islands: in the former case the coefficient of correlation is very small, and about equal to its probable error, so that we cannot conclude that there is any correlation; but in the latter case the coefficient is found to be $\cdot 374 + \cdot 065$, and indicates that there is a distinct connection between the rainfall in the east of England and that in the Channel Islands. Another example taken was rainfall and typhoid cases in Surrey districts, the water supply of which is obtained from river sources. The coefficient of correlation is ·116, with a probable error of ·073, so that it is impossible to assert definitely that there is any relation between rainfall and typhoid—at any rate on the evidence afforded by these statistics. Reference was made to a paper on

barometric heights by Professor Karl Pearson, F.R.S., and Dr. Alice Lee, and to the use of the coefficient of correlation by Dr. Gilbert T. Walker, F.R.S., in his interesting memoranda on the meteorology of India.

The author concluded with an appeal for the more scientific treatment of statistics by modern methods.

An Analytical Study of the Meteorological Observations made at the Glossop Moor Kite Station during the Session 1906-1907. By Margaret White, T. V. Pring and J. E. Petavel, F.R.S.

In Part I. the change of temperature with height is considered. The rate of fall, or temperature gradient, is measured in degrees centigrade per hundred metres. The average gradient for the present year is given for the various English stations at each successive 500 metres above sea level. The values for Glossop Moor are 1·24° C., 0·91° C., 0·61° C. and 0·33° C., per 100 metres at heights of 400, 750, 1250, and 1750 metres. These results are compared with the observations made in previous years in America at Blue Hill, and in Europe at Berlin, Oxshott, and Crinan.

The temperature gradient varies: (1) with the wind direction, and is at all levels a maximum for a N.W. wind; (2) with the amount of clouds, and is at all levels a maximum on clear and fine days; (3) with the wind velocity, and is a maximum for low velocities.

Tables and diagrams illustrating these facts are included in the paper.

Part II. deals with the question of wind velocity. The average velocity is calculated for all stations at ground level, 500, 1000, and 1500 metres. For Glossop Moor the averages are 13, 26, 30, and 33 miles per hour respectively at these heights. Except at the ground level where it is influenced by local conditions, the average wind velocity at each height differs but little from station to station.

Comparing the velocities at various heights it is found that above a height of 500 metres the average increase is 0·6 mile per hour per 100 metres difference of level.

Curves showing the connection between the wind velocity and barometric gradient are given.

The effects of the absolute barometric height, of the season of the year and the wind direction, are also considered.

With regard to the alteration of wind direction with height, the results usually indicate a slight rotation in a clockwise direction, *i.e.*, a west wind tends to become more northerly, &c.

A number of subsidiary questions, such as the conditions prevailing during temperature inversions, the occurrence of vertical air currents, and a general discussion of the hygrometric observations, are included in the paper.

Investigation of the Upper Atmosphere by Means of Kites in co-operation with a Committee of the Royal Meteorological Society.—Sixth Report of the Committee, consisting of Dr. W. N. Shaw (Chairman), Mr. W. H. Dines (Secretary), Mr. D. Archibald, Mr. C. Vernon Boys, Dr. R. T. Glazebrook, Dr. H. R. Mill, Professor A. Schuster, and Dr. W. Watson. (Drawn up by the Secretary).

Meetings of the Joint Committee were held on November 13th, 1906; also on January 24th, May 9th, May 23rd, and July 5th, 1907. Observations have been made by Mr. J. E. Petavel, F.R.S., at Glossop Moor, whose report on the subject is appended.

The Committee have had under consideration a circular sent out by Professor Hesgesell, the President of the International Aeronautical Commission. In it he asks for the co-operation of England in a special series of kite and balloon ascents, and the Committee have arranged for some ascents, in addition to those undertaken by the Meteorological Office, on the specified days.

At the meeting of the Joint Committee held on May 9th it was suggested that the British Association Committee should ask for re-appointment and for a grant of £25.

Glossop Moor Kite Station (Peak District). Report for the Session 1906-1907. By J. E. Petavel, F.R.S.

This kite station was established in the spring of 1906 by Mr. G. C. Simpson.

The necessary winding gear was purchased by aid of a grant from the Royal Meteorological Society; the other initial and current expenses have been defrayed by the Manchester University.

During the present session some sixty successful ascents have been made, Messrs. T. V. Pring and W. A. Harwood having kindly acted as voluntary assistants.

Miss Margaret White has undertaken an analytical study of the records obtained, and proposes to give a short account of the results of the work at the coming meeting of the British Association.

Recently the Government Grant Committee of the Royal Society have awarded the funds required to complete and perfect the apparatus installed at this station.

Meteorological Observations on Ben Nevis.—Report of the Committee, consisting of Lord McLaren (Chairman), Professor Crum Brown (Secretary), Sir John Murray, Professor F. W. Dyson, and Mr. R. T. Omond.

As mentioned in the report for 1905, the meteorological observations on Ben Nevis have now ceased, but the Committee have co-operated with the Scottish Meteorological Society in the discussion of the observations made on Ben Nevis and at Fort William during the twenty-one years that the observations were carried on. This discussion was conducted under the direction of the late Dr. Alexander

Buchan, but owing to his death on May 13th last no report can be furnished this year. It is proposed that the discussion be continued by Mr. Omond and others during the ensuing year.

The observations made at the high and low level observatories from the opening of the Ben Nevis Observatory in 1883 till the end of 1897 have been published, and those for two additional years—1898 and 1899—are in type. The observations to the end of 1887 were published by the Royal Society of Edinburgh. The cost of printing those of the succeeding twelve years—1888 to 1899 inclusive—has been defrayed by a grant of £500 from the Royal Society of London, and anothar grant of £500 from the Royal Society of Edinburgh. There still remain nearly five years' observations in manuscript, namely, from January, 1900, to September, 1904. The Committee consider it exceedingly desirable that these last observations should also be published, so that the whole record from the Ben Nevis Observatory be made available to meteorologists.

The estimated cost of printing these observations is £400, and towards this the Royal Society of Edinburgh has offered a grant of £200, spread over four years, on condition that the remainder of the money be obtained from other sources. The Royal Society of London has voted £50 for this object, so that there is still a sum of £150 required to make up the £400 necessary for the complete publication of the Ben Nevis records.

The Committee hope that the British Association will see its way to make up this deficiency by a grant from its funds, so as to enable the printing to go forward. The Committee beg to point out that it is some years since a grant was asked for the Ben Nevis work, and that at present there are no funds available for the purpose except what have been promised by the two scientific societies.

INTERNATIONAL INVESTIGATION OF THE UPPER ATMOSPHERE.

By William Marriott, F.R.Met.Soc.

During the last few years systematic attempts have been made to acquire information as to the meteorological conditions prevailing in the upper regions of the atmosphere. The method generally adopted has been to send up kites carrying meteorographs, which give records of the pressure, temperature and humidity. The direction in which the kite is flying shows the direction of the wind at that altitude, and the "pull" on the wire is an indication of the force of the wind.

In 1901, the Royal Meteorological Society and the British Association appointed a joint Committee to carry out such investigations in this country. The Committee were fortunate in securing the valuable co-operation and help of Mr. W. H. Dines, F.R.S., who kindly carried out the work, and also made the kites and winding

apparatus, and designed the light and simple meteorographs now in use. In the summers of 1902-3-4, kite ascents were made from specially chartered steamers off the west coast of Scotland. Mr. Dines continued the observations for the joint Committee at Oxshott until the Meteorological Office made the investigation of the upper atmosphere a branch of their work, and invited Mr. Dines to be superintendent of the work.

Mr. C. J. P. Cave has established a kite station at Ditcham Park, near Petersfield, where he has carried out numerous ascents. Mr. Salmon also has a kite station at Brighton.

Under the auspices of the joint Committee a kite station has been established, under the supervision of Prof. A. Schuster, F.R.S., at Glossop Moor, and the ascents have been carried out first by Dr. G. C. Simpson, and subsequently by Mr. J. E. Petavel, F.R.S. A summary of all the kite observations appears regularly in the "Weekly Weather Report" of the Meteorological Office.

The International Commission of Scientific Aeronautics, at their meeting last year at Milan, resolved to carry on during the years 1907 and 1908 a much more extended investigation of the upper atmosphere over the Northern Hemisphere than had hitherto been attempted. For this purpose, it was decided to supplement the kite observations by using pilot balloons (*ballons sondes*) to carry self-recording instruments, and also smaller balloons, the heights and drift of which were to be determined by two theodolites placed at the ends of a fixed base. The special ascents in 1907 were to be made on July 22nd to 27th, September 4th to 6th, and November 6th to 8th.

This scheme was heartily taken up by observers in most of the countries in the Northern Hemisphere. The Prince of Monaco proposed to make experiments in the far north; and the German Admiralty intended to send out a vessel fitted up for balloon ascents between Iceland and Norway. Another German expedition was also to be sent to the latitude of the Hebrides; while the French Admiralty intended sending out a vessel to the neighbourhood of the Azores. M. Teisserenc de Bort and Prof. A. L. Rotch also intended arranging ascents from their yacht, "Otaria," in the region of the trade winds and the doldrums.

With regard to the British Isles, the joint Kite Committee arranged for three stations, viz., at Sellack, in Herefordshire, under the charge of Capt. C. H. Ley; at Manchester University, under the charge of Mr. J. E. Petavel, F.R.S.; and at Trinity College, Dublin, under the charge of Prof. W. E. Thrift. The Meteorological Office also arranged for three stations, viz., Pyrton Hill, Oxon, and at Crinan, in Scotland, both under the supervision of Mr. W. H. Dines, F.R.S.; and at Ditcham Park, under the charge of Mr. C. J. P. Cave.

One or more balloons were sent up each day between July 22nd and 27th, from each of these stations. Twenty-four meteorographs

were sent up, some of which have been recovered. Two of those sent up from Manchester, reached a height of about 10 miles, and the lowest temperature recorded was about —58° F.

Unfortunately, low clouds prevailed during most of the period over which the experiments were carried out, and so comparatively few trigonometrical measurements could be made of the heights and drift of the balloons.

As the cutting of the corn is now in full swing, and as shooting is soon to commence, may I ask those of your readers who are engaged in the same to keep a sharp look out for the little cylinders containing meteorographs, and to carefully handle them (so as not to vitiate the records), and to return them to the address given on the label, or to forward them direct to me at 70, Victoria Street, Westminster.

I may mention that the next special series of ascents will be from the 4th to 6th of September.

It is hoped that when all the observations have been collated and discussed, much valuable information will have been obtained regarding the meteorological conditions prevailing in the upper regions of the atmosphere over the Northern Hemisphere.

THE SUN AS A TWINKLING STAR.

By Miss C. O. Stevens.

With the employment of a suitable screen of some woven fabric (such as canvas or linen) to shield the eye from a too-blinding glare of sunlight, direct naked-eye observations of the sun may be made which show that the sun, shining in a cloudless sky, presents the normal appearance of a twinkling star, only on a greatly enlarged scale. Attentive observation of the phenomena of "twinkling," associated by this means with the sun, confirms the conclusion that, in their origin, they are to be traced to the same causes exactly as provoke the normal scintillations of the stars.

But it is to be noted that certain characteristics of these phenomena are most readily and reliably to be observed only in association with observation of the sun, owing, doubtless, to the comparatively great diameter of the area of illumination that offers for the purposes of the observation.

Thus, the sun offers special advantages for study of the various characteristics, and the possible sources of the interferences, that affect the direct passage of light through the Earth's atmosphere.

In the case of the sun, the phenomena of "twinkling" resolve themselves into the sweeping across the line of sight of bands or waves of alternately greater or less illumination, in parallel formation, lying at right angles to the direction of their propagation, and observation has shown, that while their direction of movement is variable, it bears a constant relation to the directions of drift of the atmosphere prevailing at the time and place of observation, whether these contemporaneous conditions be determined by ordinary methods

(wind-vanes, kites, etc.), or whether they may *only* be determined by the more searching method of telescopic observation of the features of atmospheric distortion of the sun's limb.

In offering a solution of the phenomena of stellar scintillations, Montigny surmises the occurrence in the upper regions of the atmosphere of the passage, across the line of sight between the star and the observer, of transparent prisms of air. The physical reality of such prisms of clear air is, presumably, demonstrated in the photographic records of the sun, taken at the Royal Observatory, Greenwich, and elsewhere, which appear to testify to a waved, or billowed, configuration of the atmospheric strata, and even to testify to the variability of their formation in detail, as well as of their direction and rate of movement. In other words, the features of atmospheric distortion of the sun's limb vary concordantly with variations in the direction and force of drift of the overlying strata of the atmosphere at the place of observation.

Further confirmation of the same is supplied by recorded observations of "shadow bands" at times of total solar eclipse; and also in the familiar features of "rippled" cloud structures. It is again, and perhaps pre eminently, confirmed by the fact that (in spite of their visibility to the naked eye being theoretically denied) stellar scintillations are easily to be traced in the zenith, though at all times less easily here than at lower altitudes.

The direction of propagation of the "twinkling" waves is a delicate element to determine precisely by naked-eye observation of the sun, and requires, on the part of the observer, an absolutely fixed point of view, such as is only to be secured by the use of some kind of head-rest.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

GOLDEN MARCH DUST.

I MAY observe, with regard to recent correspondence in your pages, that March dust is "worth its weight in gold" in Western Austria also by common consent, and its golden value is apparent from the agricultural point of view. The ground for this belief is the warming of the soil, which takes place very rapidly on sunny days in March, and at that time of year warm soil is of greater importance to crops than high air temperature. If the soil remains cold the warmth of the air does little good; in fact, it often does harm by increasing evaporation, whilst the activity of the roots in the cold soil is insufficient to bring up moisture from below, and the plants get dried up. On the other hand, a wet April, and especially a wet May, is greatly valued by our farmers.

J. HANN.

Vienna, 19th August, 1907.

THUNDERSTORM OF 21st JULY, 1907, IN THE CARTMEL DISTRICT.

THE severe thunderstorm on Sunday, the 21st, was really a succession of thundershowers, and, so far as this district was concerned, its full force seemed to be expended at Grange, Lindale-in-Cartmel, and up the Winster valley on the border of Lancashire and Westmorland.

Sheep were killed on Hampsfell Farm, above Grange, and on land near Lindale. At Farnside, Crosthwaite, on the Westmorland side of the Winster, a ball of fire fell in the lot, 100 yards above the house, splitting the rock open for yards, which, with the loose stones about it, appeared to have been blasted. A valuable horse was found injured at the foot of the rock, but whether struck by lightning or frightened by the shock is not known; we understand it is improving nicely, although, no doubt, its value must in any case be somewhat reduced. None of the family at the house were injured, though they felt a slight shock.

At Carke we heard the thunder and saw flashes of lightning most of the afternoon and during the night. We had ·22 in. of rain in the afternoon, and ·42 in. came with thunder-showers during the night.

At Yew-barrow House, Grange, there were five separate thunderstorms between 3 p.m. on Sunday and 1 a.m. on Monday morning.

Rainfall in 24 hours at		Flookburgh Lodge.....	·61 ins.
,,	,,	The Mount, Carke.....	·64 ,,
,,	,,	Holker Gardens.....	·66 ,,
,,	,,	Aynsome, Cartmel.....	1·17 ,,
,,	,,	Yew-barrow, Grange.....	2·23 ,,

During the same time we find that at Broughton-in-Furness there fell ·65 in., and at Sawrey, near Hawkshead, ·62 in.

W. R. NASH.

The Mount, Carke-in-Cartmel.

AUGUST SHOOTING STARS.

THOUGH these bodies are of cosmical origin and are now usually understood to belong to the purely astronomical branch of science, the fact that they are rendered luminous in our atmosphere, and consumed there, still justifies them in holding a place amongst meteorological phenomena. For this reason I send you a few brief notes of the return of the August shower of Perseids this year. It was already distinctly visible on August 4th and 6th, for a few bright meteors were seen during those nights which were directed from the usual point in Perseus. On August 10th the hourly number of shooting stars visible during the night increased from 25 to 45. On

August 11th the number varied from 15 to 36. On August 12th there was apparently a slight increase, the hourly numbers ranging from 23 to 50.

The place of the radiant point on August 10th was at 44° + 56°, and on August 12th at 47° + 57°. On the whole the shooting stars appeared to be rather smaller, and somewhat less abundant, than during a pretty conspicuous return of the shower.

Of meteors not belonging to the Perseid stream, a few very interesting examples were recorded. On August 10th, at 10.30 p.m., a bright meteor fell near Alpha Andromedæ from the direction of Cygnus, and on the same night at 11.6 p.m. a conspicuous slow-moving object sailed through the northern part of Cassiopeia, from the direction of Aquila..

Miss Irene Warner, of Horfield Common, Bristol, has kindly sent me notes of her observations on August 11th and 12th. Watching for two hours, between 9.25 p.m. and 11.40 p.m. on August 11th, she counted 56 meteors, of which 9 only belonged to showers other than the Perseids. On August 12th, in 2½ hours between 9.15 p.m. and 0.20 a m., she counted 49 meteors, and they were nearly all Perseids. A bright meteor was seen on August 12th at 10.55 p.m. It passed slowly along from Delta to Alpha Cygni, and left a bright yellow train. At about 11.12 p.m. a very large meteor burst out suddenly close to the radiant point of the Perseids, and moved to south-east, almost parallel with the stars Gamma, Alpha and Delta in Perseus. The meteor left a bright streak. It appears to have been also observed by Mr. Kenyon at Stockport, and Mr. Corder at Bridgwater, and its real height was from 79 to 44 miles. The middle of its course was vertically over Rugby. Mr. Kenyon describes the meteor as flashing out with a brightness equal to the moon.

Though the recent display failed to exhibit exceptional richness, it has furnished us with some new and interesting data, which may contribute to advance our knowledge of one of the most important meteoric streams with which we are acquainted.

W. F. DENNING.

Bristol, August 14th, 1907.

SUGGESTED TERMINOLOGY.

READING over once more the prefatory Report of "British Rainfall, 1905," it seems just worth while to offer for consideration respecting "Terminological exactitude," for *a succession of more than fourteen days on each of which rain fell*, this compound word, *rain-run*, or (as one word) *rainrun*.

J. FIRTH.

The Cemetery, Huddersfield, July 11th, 1907.

BRITISH RAINFALL, 1906.

THE annual volume, which brings to a focus the work of the great army of rainfall observers in Great Britain and Ireland, has just been published under the title of "British Rainfall, 1906. On the Distribution of Rain in Space and Time over the British Isles during the year 1906, as recorded by more than 4,000 Observers in Great Britain and Ireland, and discussed, with Articles upon various branches of Rainfall work, by Hugh Robert Mill. The Forty-sixth annual volume, with maps and illustrations. London: Edward Stanford, 12, 13 and 14, Long Acre, W.C. 1907."

The frontispiece is a coloured map, showing the variation of the rainfall of the British Isles in 1906 from the average of thirty years. By the use of deepening tints of blue for rainfall progressively more and more above the average, and deepening shades of red for rainfall more and more below the average, the wet and dry areas are made to stand out very clearly.

As usual the volume is divided into two parts. Part I. contains a report of the work of the Rainfall Organization and two original papers. One of these, by the Editor, gives a discussion of the great snowstorm of Christmas, 1906, based on special reports by nearly 2,000 observers in all parts of the country. Two maps illustrate the depth of snow and the hour at which the snowfall commenced. The latter is of particular interest, as it shows the lines along which snow began to fall simultaneously, the earliest being before noon on Christmas Day in the north-east of Ireland, the latest after 2 a.m. on Boxing Day in the extreme south-east of England. The second article is a *resumé* by Mr. Bonacina, with a bibliography, of the investigations which have been made into the influence of wind on the catch of rain in rain gauges. The remainder of part I. deals with observations on evaporation and on the duration of rainfall, specimen registers of daily rainfall, and a complete list of the changes in observing stations as compared with the previous year. The last article is devoted to the Obituary, and this is unhappily a long one, as the number of observers recently deceased is greater than in any previous year.

Part II. is devoted largely to the remarks of individual Observers on the weather of the days, months, and of the whole year in 1906, but it also contains detailed discussions of heavy falls of rain, with maps showing the distribution of rainfall on the wettest days of the year. These maps bring out the relation of the areas of heaviest precipitation to the track of the atmospheric depressions with which the rain was associated.

The discussion of the distribution of rainfall in time is continued in accordance with the plan first adopted in 1903, and the various features are illustrated by maps. Then follow the discussion of the rainfall of the months, individually and in groups, and of the year

as a whole, maps being freely used to show the difference between 1906 and an average year.

Last of all comes the General Table of total annual rainfall at the 4,267 points where rain gauges are now established, and it gives the names of all the Observers or other authorities for the record.

METEOROLOGICAL NEWS AND NOTES.

THE FIVE HUNDREDTH NUMBER of *Symons's Meteorological Magazine* is now before our readers, a fact of no little interest when the smallness of the public to which such a journal appeals is taken into account. When Mr. Symons produced No. 1 in February, 1866, he had already issued a "monthly rain circular," as a supplement to "British Rainfall" for several years, so that a greater antiquity might plausibly be claimed for the Magazine than the numeral implies. The Magazine, though small, has grown, and is not, we trust, incapable of further growth without departing from the original lines on which it was planned. As an independent organ of opinion in meteorological matters, it has, we believe, been of use in the past, and we hope that this usefulness will continue. We heartily thank the many friends who have helped us hitherto, and we look forward with confidence to a wider circle of readers.

DR. G. HELLMANN has, we are happy to learn, been appointed Professor of Meteorology in the University of Berlin and Director of the Prussian Meteorological Service, in succession to the late Professor von Bezold.

TEMPERATURE FOR AUGUST, 1907.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32°	
									Shade.	Grass.
		° ′	° ′	ft.	°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	78·3	4	44·1	2	0	0
Tenterden	*Kent*	51 4	*0 41	190	77·0	4, 29	44·0	20, 21	0	0
West Dean	*Hampshire*	51 3	1 38	137	73·0	29	37·0	25	0	5
Hartley Wintney	,,	51 18	0 53	222	74·0	5, 29	38·0	26	0	0
Hitchin	*Hertfordshire*	51 57	0 17	238	72·0	3†	41·0	27	0	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	73·0	4	39·0	28	0	0
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	78·0	29	44·0	1, 2	0	...
Brundall	*Norfolk*	52 37	*1 26	66	77·4	4	43·0	14	0	0
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	70·8	28	38·8	25	0	...
Torquay (Cary Green)	*Devon*	50 28	3 32	12	70·6	29	47·7	21	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	70·0	29	40·2	28	0	0
Bath	*Somerset*	51 23	2 21	67	72·0	13	44·0	24	0	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	74·0	29	48·0	1§	0	...
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	70·0	13	32·0	20	1	...
Coventry Kingswood	*Warwickshire*	52 24	1 30	340	72·0	9	42·0	26	0	...
Boston	*Lincolnshire*	52 58	0 1	25	75·0	4	42·0	28	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	72·7	3	37·6	28	0	1
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	74·0	3, 4	37·0	27	0	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	67·7	4	42·0	30	0	0
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage	,, ,,	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	74·0	4, 5, 12	42·0	24, 28	0	0
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	63·6	4	38·4	30	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	...	..	...	...	...	0
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	71·0	5‡	33·0	23	0	...
Llandudno	*Carnarvon*	53 20	3 50	72	69·8	13	45·7	30	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	66·0	12	34·0	30	0	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	...	..	...	...	...	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	66·1	4	42·6	2	0	0
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	67·0	13	35·0	30	0	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	67·0	20	42·0	1, 25	0	3
Tighnabruaich	*Argyll*	55 55	5 14	50	62·0	12	38·0	31	0	0
Mull (Quinish)	,,	56 36	6 13	35	65·0	15	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	69·2	9	38·0	30	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	68·0	6, 7	35·0	29, 31	0	...
Cawdor (Budgate)	*Nairn*	57 31	3 57	250	...	...	...	...	...	...
Invergarry	*E. Inverness*	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle	*Sutherland*	57 59	3 56	14	61·0	22	42·0	31	0	...
Castletown	*Caithness*	58 35	3 23	100	64·0	5, 18	36·0	13, 28	0	0
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	70·0	14	46·0	1	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	69·0	12	40·0	30	0	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	68·0	1	40·0	29	0	...
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	71·0	13	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	73·1	13	44·1	30	0	0
Ballinasloe	*Galway*	53 20	8 15	160	69·5	28	30·0	30	1	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	71·0	12, 13	40·0	29	0	0
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	...	...	...	...	...	...

† and 4, 14, 29. ‡ and 18, 29. § and 23, 24.

RAINFALL FOR AUGUST, 1907.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1907.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1907.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·33	1·94	— ·39	83	·50	14	13	15·45	13·94	— 1·51	90	25·16	Camden Square
2·37	1·93	— ·44	81	·79	17	12	16·18	13·29	— 2·89	82	28·36	Tenterden
2·60	1·79	— ·81	69	·88	17	15	17·83	13·99	— 3·84	78	29·93	West Dean
2·09	2·64	+ ·55	126	1·10	17	13	16·06	15·59	— ·47	97	27·10	Hartley Wintney
2·26	1·77	— ·49	78	·49	2	15	15·07	14·59	— ·48	97	24·66	Hitchin
2·53	1·78	— ·75	70	·65	2	14	16·58	14·84	— 1·74	90	26·75	Addington
2·40	2·27	— ·13	95	·60	2	16	15·63	16·24	+ ·61	104	25·39	Westley
2·19	1·13	—1·06	52	·36	2	14	15·01	16·00	+ ·99	107	25·40	Brundall
3·18	1·72	—1·46	54	·40	17	13	22·32	17·90	— 4·42	80	39·00	Winterbourne Stpltn
2·91	·72	—2·19	25	·17	17	13	20·69	15·90	— 4·79	77	35·00	Torquay
3·19	1·82	—1·37	57	·44	17	19	21·57	19·09	— 2·48	89	38·85	Polapit Tamar
2·96	2·22	— ·74	75	·67	2	19	18·82	19·14	+ ·32	102	30·75	Bath
2·83	2·12	— ·71	75	·57	17	19	18·56	17·80	— ·76	96	29·85	Stroud
3·24	3·32	+ ·08	102	·85	14	16	20·21	21·26	+ 1·05	105	33·04	Wolstaston
2·77	2·65	— ·12	96	·67	2	15	18·08	17·75	— ·33	98	29·21	Coventry
2·25	1·96	— ·29	87	·55	2	13	14·45	13·16	— 1·29	91	23·30	Boston
2·31	1·72	— ·59	75	·77	14	14	15·63	13·52	— 2·11	86	24·70	Hodsock Priory
2·42	3·38	+ ·96	140	1·29	14	15	16·53	19·16	+ 2·63	116	26·18	Derby
4·36	5·37	+1·01	123	1·42	14	21	25·23	31·88	+ 6·65	126	42·43	Bolton
2·59	1·72	— ·87	66	·60	14	15	16·83	16·55	— ·28	98	26·96	Ribston Hall
5·43	5·37	— ·06	99	·73	7	24	36·87	41·58	+ 4·71	113	60·96	Arncliffe Vic.
2·81	1·61	—1·20	57	·79	14	12	16·55	15·32	— 1·23	93	27·02	Hull
3·14	2·32	— ·82	74	·61	15	18	17·40	16·00	— 1·40	92	27·99	Newcastle
11·23	13·65	+2·42	122	3·38	11	26	77·96	81·11	+ 3·15	104	132·68	Seathwaite
4·52	3·89	— ·63	86	1·08	2	22	25·23	23·35	— 1·88	93	42·81	Cardiff
4·04	4·39	+ ·35	109	1·12	2	14	27·41	25·48	— 1·93	93	47·88	Haverfordwest
4·60	4·88	+ ·28	106	1·25	15	16	26·46	30·37	+ 3·91	115	45·41	Gogerddan
2·86	3·37	+ ·51	118	·67	14	17	17·65	16·21	— 1·44	92	30·98	Llandudno
4·10	4·63	+ ·53	113	·90	14	20	26·15	30·63	+ 4·48	117	43·43	Cargen
3·42	...	..	...	...	...	...	20·56	...	...	...	33·04	Riddell House
...	3·52	...	...	·91	14	21	...	19·68	...	...	...	Edinburgh
4·34	5·88	+1·54	135	·64	18	31	28·46	...	...	...	48·87	Girvan
3·79	4 65	+ ·86	123	·92	11	24	22·09	26·43	+ 4·34	120	35·80	Glasgow
5·13	6·48	+1·35	126	·86	28	25	34·11	40·26	+ 6·15	118	57·90	Tighnabruaich
4·84	7·99	+3·15	165	1·27	28	29	33·06	35·75	+ 2·69	108	57·53	Quinish
3·08	3·80	+ ·72	123	·45	9,	23	18·20	20·10	+ 1·90	110	28·95	Dundee
3.83	3·35	— ·48	87	...	...	...	21·66	20·80	— ·86	96	36·07	Braemar
3·22	2·55	— ·67	79	·37	2	22	19·93	19·39	— ·54	97	33·01	Aberdeen
3·07	3·27	+ ·20	107	·46	10	20	18·33	21·39	+ 3·06	117	29·37	Cawdor
4·19	6·83	+2·64	163	·70	29	26	32·69	40·93	+ 8·24	125	56·00	Invergarry
6·91	9·59	+2·68	139	·71	28	31	49·41	64·96	+15·55	132	86·50	Bendamph
2·65	3·70	+1·05	140	·81	18	18	18·92	23·81	+ 4·89	126	31·60	Dunrobin Castle
...	4·38	...	...	·84	18	31	...	22·43	...	...	...	Castletown
4·92	4·40	— ·52	89	·83	4	24	34·90	25·70	— 9·20	74	58·11	Killarney
3·71	3·01	— ·70	81	·95	2	12	24·00	21·63	— 2·37	90	39·30	Waterford
3·79	3·50	— ·29	92	·40	11	26	20·85	22·11	+ 1·26	106	33·47	Hurdlestown
3·94	3·11	— ·83	79	·38	28	23	22·19	22 97	+ ·78	104	35·19	Abbey Leix
3·02	2·23	— ·79	74	·50	29	19	17·53	16·58	— ·95	95	27·75	Dublin
3.96	3·03	— ·93	77	·45	7	23	23·19	23·68	+ ·49	102	37·04	Ballinasloe
7·90	...	...	...	...	...	...	48·34	...	...	...	80·23	Kylemore House
4·57	3·77	— ·80	82	·49	3	29	29·90	32·33	+ 2·43	108	50·50	Enniscoe
3·52	3·36	— ·16	95	·47	2	22	23·84	26·21	+ 2·37	110	38·61	Seaforde
3·94	5·07	+1·13	129	·62	7	30	24·48	34·81	+10·33	142	41·20	Londonderry
4·03	...	...	...	.	...	...	23·28	...	...	...	37·85	Omagh

|| and 12, 28.

SUPPLEMENTARY RAINFALL, AUGUST, 1907.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	3·69	XI.	Rhayader, Tyrmynydd	4·32
,,	Ramsgate	1·31	,,	Lake Vyrnwy	...
,,	Hailsham	1·62	,,	Llangyhanfal, Plâs Draw....	2·32
,,	Crowborough, Uckfield Lodge	2·75	,,	Criccieth, Talarvor	3·13
,,	Totland Bay, Aston House.	1·32	,,	Llanberis, Pen-y-pass	16·98
,,	Emsworth, Redlands	1·84	,,	Lligwy	4·40
,,	Alton, Ashdell	3·04	,,	Douglas, Woodville	4·22
,,	Newbury, Welford Park ...	2·02	XII.	Stoneykirk, Ardwell House	4·33
III.	Harrow Weald, Hill House.	1·72	,,	Dalry, The Old Garroch ...	6·93
,,	Oxford, Magdalen College...	1·25	,,	Langholm, Drove Road	7·57
,,	Bloxham Grove	2·19	,,	Moniaive, Maxwelton House	5·10
,,	Pitsford, Sedgebrook	2·49	XIII.	N. Esk Reservoir [Penicuick]	4·85
,,	Huntingdon, Brampton	2·07	XIV.	Maybole, Knockdon Farm..	2·72
,,	Wisbech, Bank House	2·07	XV.	Campbeltown, Witchburn...	5·55
IV.	Southend Water Works	1·64	,,	Inveraray, Newtown	9·97
,,	Colchester, Lexden	2·00	,,	Ballachulish House	9·84
,,	Newport, The Vicarage	2·19	,,	Islay, Eallabus	6·59
,,	Rendlesham	1·48	XVI.	Dollar Academy	5·57
,,	Swaffham	1·98	,,	Loch Leven Sluice	4·16
,,	Blakeney	1·91	,,	Balquhidder, Stronvar	8·25
V.	Bishops Cannings	3·09	,,	Perth, Pitcullen House	3·56
,,	Ashburton, Druid House ...	1·42	,,	Coupar Angus Station	3·78
,,	Okehampton, Oaklands	2·97	,,	Blair Atholl	4·06
,,	Hartland Abbey	2·70	,,	Montrose, Sunnyside Asylum	2·41
,,	Lynmouth, Rock House ...	2·86	XVII.	Alford, Lynturk Manse ...	2·71
,,	Probus, Lamellyn	1·32	,,	Keith Station	3·20
,,	Wellington, The Avenue ...	...	XVIII.	N. Uist, Lochmaddy	5·10
,,	North Cadbury Rectory ..	2·28	,,	Alvey Manse	3·06
VI.	Clifton, Pembroke Road ...	2·29	,,	Loch Ness, Drumnadrochit.	2·81
,,	Ross, The Graig	2·66	,,	Glencarron Lodge	9·10
,,	Shifnal, Hatton Grange	2·88	,,	Fearn, Lower Pitkerrie	1·39
,,	Cheadle, The Heath House.	3·62	XIX.	Invershin	3·09
,,	Blockley, Upton Wold	2·41	,,	Altnaharra	3·04
,,	Worcester, Boughton Park.	2·26	,,	Bettyhill	4·93
VII.	Market Overton	2·44	XX.	Dunmanway, The Rectory..	6·08
,,	Market Rasen	2·41	,,	Cork	...
,,	Bawtry, Hesley Hall	1·96	,,	Darrynane Abbey	5·72
VIII.	Neston, Hinderton Lodge...	2·95	,,	Glenam [Clonmel]	2·54
,,	Southport, Hesketh Park...	3·70	,,	Ballingarry, Gurteen	3·40
,,	Chatburn, Middlewood	4·93	,,	Miltown Malbay	5·64
,,	Cartmel, Flookburgh	4·81	XXI.	Gorey, Courtown House ...	2·42
IX.	Langsett Moor, Up. Midhope	3·23	,,	Moynalty, Westland	3·12
,,	Scarborough, Scalby	1·57	,,	Athlone, Twyford	3·33
,,	Ingleby Greenhow	2·39	,,	Mullingar, Belvedere	3·15
,,	Mickleton	2·32	XXII.	Woodlawn	4·62
X.	Bardon Mill, Beltingham ...	..	,,	Westport, Murrisk Abbey..	...
,,	Ewesley, Fallowlees	2·99	,,	Collooney, Markree Obsy..	4·02
,,	Ilderton, Lilburn Cottage...	2·10	,,	Mohill	3·51
,,	Keswick, York Bank	4·93	XXIII.	Enniskillen, Portora	...
XI.	Llanfrechfa Grange	3·89	,,	Warrenpoint, Summer Hill.	2·85
,,	Treherbert, Tyn-y-waun ...	9·23	,,	Banbridge, Milltown	2·69
,,	Carmarthen, The Friary	4·71	,,	Belfast, Springfield	3·95
,,	Castle Malgwyn [Llechryd].	3·26	,,	Bushmills, Dundarave	5·28
,,	Plynlimon	14·35	,,	Stewartstown, The Square..	3·14
,,	Crickhowell, Ffordlas	2·40	,,	Killybegs	7·48
,,	New Radnor, Ednol	3·90	,,	Horn Head	5·27

METEOROLOGICAL NOTES ON AUGUST, 1907.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

CAMDEN SQUARE.—Another month of low temp., the mean being 60°·8, or 1°·3 below the average: the max. temp. was low throughout. Unsettled weather prevailed during the third week with T at times, and a violent squall occurred on 20th, accompanied by T, L, R and H. Duration of sunshine 149·7* hours, and of R 27·3 hours.

CROWBOROUGH.—Low temp. and frequent R up to 22nd, after which warmer and more settled. R ·24 in. below the average of 36 years. Mean temp. 58°·1, or 2°·1 below the average.

BURY ST. EDMUNDS.—Cold and dull, with little sunshine except in the last week. Corn ripened very slowly, and much was not yet fit to cut at the end of the month.

TORQUAY.—Duration of sunshine 189·6* hours, or 17·9 hours below the average. Mean temp. 60°·6, or 1°·0 below the average.

NORTH CADBURY.—A cool, cloudy and showery August, windy from 6th to 23rd, but quiet and warm at the end.

WOLSTASTON.—Cold and wet with insufficient sunshine. On 20th a frost occurred in the air, which is unprecedented in August.

BOLTON.—The temp., particularly that of the earth, was again very low. Mean temp. 55°·1, or 2°·7 below the average. Duration of sunshine 104·6* hours, or 13·7 hours below the average. Crops were late and harvest conditions bad.

SOUTHPORT.—Cool, but chiefly remarkable for abnormal prevalence of strong S.W. and W. winds. Mean temp. 57°·5, or 1°·8 below the average. Duration of sunshine 163* hours, or 17 hours below the average. Duration of R 68·3 hours. Water levels were very high.

CARMARTHEN.—Wet and cold. The hay harvest was much retarded by constant R, and corn was a good deal beaten down, but forage was plentiful.

HAVERFORDWEST.—Generally cold and unsettled, with considerable R. Corn crops were much damaged by R and strong winds. Duration of sunshine 151·2* hours.

DOUGLAS.—A most unseasonable month, nearly if not quite as bad as June. It was cold, wet, gloomy and extremely windy, with hardly one calm or summer-like day to redeem its evil character.

CARGEN.—Wet and sunless, with strong W. winds whenever it did not rain. Hay was much damaged, and corn wherever heavy was considerably "lodged"; the harvest was not commenced at a date three weeks later than in 1906.

STRONVAR.—Extremely wet and cold, with very little sunshine and high N.W. winds.

COUPAR ANGUS.—The coldest August since 1888. Mean temp. 53°·6, or 2°·0 below the average. It was the fourth successive month with low temp., and the fifth with R above the average.

DRUMNADROCHIT.—R ·12 below, and rain days 4 above, the average of 21 years.

DUNMANWAY.—Very fine from 19th to 27th, and warm from 23rd to 27th. Great TS on 11th, with vivid L, lasting two hours, and ·76 in. of R between 7.30 and 10.30 p.m.

DARRYNANE ABBEY.—Raw and ungenial, with few fine days. R 25 per cent. above the average.

MILTOWN MALBAY.—Continuously wet, with only two bright days. The temp. was low, and hay, corn and turf was rotting.

DUBLIN.—Changeable, cool, breezy and showery, with constant fresh westerly winds. Mean temp. 58°·8, or 0°.9 below the average.

BANBRIDGE.—R ·72 in. below the average of 45 years.

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* Campbell-Stokes.

Climatological Table for the British Empire, March, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity. (0-100)	Absolute. Max. in Sun.	Absolute. Max. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°		°	°	inches		
London, Camden Square	68·7	31	24·4	12	54·4	35·2	37·8	84	101·1	23·1	·97	13	...
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	91·5	19	73·0	2	89·4	78·8	75·1	71	156·0	70·0	2·65	4	7·4
Cape Town	91·0	9	55·0	16	76·5	60·3	57·0	69	...	...	·83	5	3·5
Durban, Natal ...	89·1	8	62·1	26	83·7	68·2	...	...	147·1	...	1·96	14	4·4
Johannesburg	79·0	6	49·0	26	74·0	54·8	55·6	79	161·0	48·8	2·86	8	3·6
Mauritius	87·2	15	69·0	31	83·9	71·4	70·4	79	155·3	62·7	7·31	20	6·6
Calcutta	93·7	9	58·0	1	87·8	67·5	64·6	68	153·0	51·2	4·02	5	3·8
Bombay...	90·4	31	70·7	14	86·6	73·9	69·3	71	132·9	62·9	·00	0	0·8
Madras	95·1	23	66·2	4	89·7	73·4	71·5	76	144·5	62·1	·00	0	2·3
Kodaikanal	72·0	15	46·0	2	68·4	51·0	44·6	64	144·2	35·2	1·79	12	3·1
Colombo, Ceylon ...	92·4	11	71·1	1	89·1	74·8	72·1	73	152·0	68·2	1·06	13	3·6
Hongkong	80·1	25	48·5	2	63·4	59·7	58·7	80	131·2	...	·34	7	8·0
Melbourne	88·9	11	43·0	27	71·2	52·9	48·7	64	146·5	31·9	1·68	9	5·6
Adelaide	89·8	11	46·5	22	75·3	55·2	49·5	58	146·0	38·3	·81	6	4·2
Coolgardie	95·9	9	50·0	13	79·8	58·6	55·8	62	165·2	46·8	5·27	9	4·4
Sydney	90·0	5	51·4	27	74·3	61·1	58·5	76	127·3	46·0	8·42	21	6·8
Wellington	77·5	12	47·6	21	67·2	57·5	54·6	74	126·0	39·0	5·49	11	6·0
Auckland	77·0	5	54·0	20	72·0	61·7	59·1	79	140·0	49·0	·97	7	5·7
Jamaica, Negril Point.	88·8	16	62·3	10	85·6	66·2	64·3	65	...	...	·08	1	...
Trinidad	90·0	16	66·0	several	85·4	69·4	70·6	78	159·0	64·0	1·71	9	...
Grenada	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	...	...	...	...	...	...	...	...	...	...	...	...	...
Fredericton	50·3	30	-17·2	1	35·0	11·6	...	67	...	...	·41	2	5·0
St. John's, N.B. ...	52·3	29	- 3·2	5	36·0	19·6	...	...	...	...	·75	6	5·3
Victoria, B.C.	57·0	20	28·7	30	49·6	35·2	...	...	...	...	1·40	14	5·7
Dawson	33·0	9	-41·5	21	9·8	-15·4	...	.	...	...	·00	0	3·8

Johannesburg.—Bright sunshine 255·8 hours, or 70 per cent. of the possible amount.

Mauritius.—Mean temp. of air 0°·1, dew point 0°·2, relative humidity 1·0 per cent., and R 1·28 in. below, averages. Mean hourly velocity of wind 6·8 miles, or 3·6 miles below average.

MADRAS.—Bright sunshine 261·1 hours.

KODAIKANAL.—Bright sunshine 245 hours.

COLOMBO.—Mean temp. of air 81°·9 or 0°·2 below, of dew point 0°·8 below, and R 3·54 in. below, averages. Mean hourly velocity of wind 6·9 miles. TSS on 3 days.

HONGKONG.—Mean temp. of air 63°·8. Bright sunshine 86·8 hours. R 2·30 in. below average. Mean hourly velocity of wind 12·8 miles.

Adelaide.—Mean temp. of air 4°·9 below, and R ·26 in. below, averages. The coldest March in the 50 years' records.

Sydney.—Mean temp. of air 1°·5 below, and R 3·20 in. above, averages.

Wellington.—Mean temp. of air 1°·8 above, and R 2°·09 in. above averages.